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AN EPITOME OF THE PROGRESS OF NATURAL SCIENCE.

(*Continued from page* 58.)

THE philosophical period, when human opinions were first released from the bondage of theocratical power, began among the Greeks; a curious and active race, whose geographical situation had contributed much to form their character, and deriving their origin, in a great measure, from the nations connected with the Euxine, or Black sea. The Pelasgi are supposed to have penetrated into Greece from India, at the earliest periods: the architectural remains, called Cyclopean walls, were of their day. In the time of Pausanias,* it was known that those walls were anterior to the arrival of the Egyptian colonies. The situation, however, and maritime habits of the Greeks, had enabled them to hold communication with the Phœnicians, Babylonians, and other nations, long before the arrival of Cecrops.† The chiefs who led these first colonies from Egypt, were not priests, but rather bold adventurers, like the Normans; and although they brought over the external form of their religion, yet it appears the meaning concealed under their emblems, was not spread amongst the people where they colonized.

Now the mythological forms in Egypt, and those generally obtaining in the east, were only the emblematic expression of a system of general philosophy, confined to the priesthood: hence science necessarily became stationary, since no one, without incurring the charge of irreligion, would venture to entertain any opinions, which did not emanate from sources that were admitted

* A. D. 175. † B. C. 1550.

to be divine. But the Egyptians having exported, as it were, the clerk without the parson, religion and science happily became separated, and the Greeks were left free, at the planting of knowledge in their country, to adopt their own philosophical opinions. The benign influence of that freedom was soon felt; it led to the establishment of a school of philosophy, and of the arts, that will be honoured and admired to the latest generations.

Of the influence of this philosophy, we are living monuments; for the revival of letters in Europe, was nothing but the revival of that philosophy; and but for this fortunate disenthralment of the human mind, from the tyranny of the sacerdotal caste, instead of the inimitable manly beauty of the Apollo, and the graceful proportions of the Venus, together with the countless treasures of sculptured excellence, that received all but life from the hands of Phidias and Praxiteles, we should probably have received nothing from Greece, but metaphysical monsters—gods with quadruple heads, and a hundred hands—goddesses with the heads of the inferior animals. Of all the nations of Greece, the Hellenes were the earliest civilized; and although the religion of the country partook strongly of the Indian and Egyptian origin—under the influence of Orpheus, at once a priest and a poet—yet the Hellenes at length introduced the worship of Apollo, the cultivation of the arts, and gave their name to the whole country. We shall pass by the period of the Trojan war, and the evidences contained in the writings of Hesiod and Homer,* of the great progress the Greeks had made in the arts, in order to come at once to the brilliant period of the schools of philosophy.

The family of the Asclepiadæ had begun to cultivate science with practical views, as far back as the thirteenth century before Christ. This was properly the ancient medical school of Greece, and the temples of Æsculapius—a name bearing a strong affinity to that of the family—were served with priests out of this family. The Ionian schools, founded by Thales of Miletus, about 600 B. C.,were spread chiefly amongst the continental Greeks of Asia Minor, and partook of an Egyptian origin; for when Psammeticus called in the Greeks to his aid,† Thales, Pythagoras, and other philosophers, passed over to receive instruction from the priests of Egypt.

Pythagoras flourished about 550 years B. C.: after finishing

* B. C. 900. † B. C. 600.

many arduous journeys in the east, undertaken through the pure love of philosophy, he retired to Crotona, in Italy. As Thales, the chief of the Ionian school, devoted all his attention to the discovery of a first principle, independently of experiments by way of induction, so Pythagoras endeavoured to discover the same principle in the power of numbers. Pythagoras is deemed to have preceded, to a certain extent, Copernicus, in the received opinions respecting planetary motions.

Herodotus, Xenophon, Hippocrates, Ctesias, and other philosophers who flourished about these times, were contributors to natural science. Herodotus, the earliest prose writer among the Greeks, had travelled extensively in the east, and in Egypt. He described the crocodile, and other animals of that country, with much accuracy. Xenophon was born thirty-nine years later than Socrates, and was one of his pupils. He was at once a soldier, a statesman, and a naturalist; was the declared enemy of the mythology of the Greeks, and taught a system of pure idealism, including all things in the divinity. In the Cynegetics, which is a treatise on hunting, he treats of the different races of dogs, and of the various kinds of game pursued by hunters: the retreats of wild beasts, their stratagems to elude pursuit, and their means of defence, are there described. It is in this work we learn that lions, panthers, jackals, and other species of wild beasts now found in hot climates only, were the inhabitants of Macedonia; an interesting zoological fact, bearing upon the speculations of some modern naturalists. Hippocrates and Ctesias belonged to the caste of the Asclepiades. In the pathological knowledge of diseases, in diagnostics, and in medical treatment, the first has acquired a great reputation, to which his fanciful and very deficient mode of considering anatomy and physiology, have not contributed. Ctesias was made a prisoner on the memorable expedition of the ten thousand, and resided, in the quality of physician, seventeen years at the Persian court. In an account of India, which he borrows from the Persian writers, he mentions the elephant, an animal at that time unknown to the Greeks. His work, however, is full of absurd stories; he describes emblematic animals as real ones, and the fabulous stories of the flying griffin, the unicorn, &c. &c., are probably due to him.

Leucippus, the founder of the atomistic school, taught that every thing was matter and motion: he was a pure materialist,

and acknowledged nothing but atoms, and a vacuum to move in. Figure and motion, and the arrangement of his atoms, produced, according to this philosopher, all the properties of bodies, colour, consistence, heat, cold, &c.

Democritus of Abdera,* a disciple of Leucippus, was a comparative anatomist, for he endeavoured to deduce the habits of animals from the differences he had observed in their organization. On the conquest of Asia-Minor by Xerxes,† the principal philosophers of these various sects, who had brought forward, in turns, all the metaphysical views known to ourselves, established themselves at Athens, in central Greece; when Anaxagoras, the father of the Socratic school, finally taught the reasonable doctrine, that mind and matter were separate principles, and cultivated more extensively the deduction of the rationale of things from practical observation.

Socrates was the true reformer of Grecian philosophy: he sought to reduce physics to common sense and observation, and metaphysics to logical reasoning. He endeavoured to overthrow the miserable sophistry that had sprung out of the Eleatic school, and it is to him we owe the elaboration of the thought of Anaxagoras, that an intelligent principle has arranged the world. If the universe, he reasoned, be the work of an intelligent mind, it must be so disposed as to concur to an intelligent end. From this great thought results the important natural truth which geology establishes, that organized beings are connected by necessary relations, *and that a perfect organized body must contain in itself, all the conditions proper to the performance of the part assigned to it.* Socrates declared his regret, at not being sufficiently conversant with natural history, to demonstrate this truth as extensively as it might be done. This great and virtuous man was a cotemporary of Pericles, Alcibiades, Xenophon, and Hippocrates, and died a victim to the intolerance of his enemies, and the splendour of his character, B. C. 399.

Plato, the youngest of the disciples of Socrates, after the death of his master, went to Egypt, and studied under the priests. He afterwards received instruction in the Pythagorean schools, established in Lower Italy: having before his travels in Egypt, exercised himself in dialectics, with Euclid—who had been himself a pupil of Socrates—he now, fraught with knowledge, returned

* Flourished B. C. 400. † B. C. 480.

to Athens, and opened the celebrated academic school, the influence of which has been so powerful. We pass over his metaphysical speculations, to his opinions which are more particularly connected with natural history. Many of these are based upon the traditions of geological revolutions, similar to those reflected to us from every people. In one of his dialogues, he supposes Solon to have been told by a priest of Sais, in lower Egypt, that Sais had been founded 10,000 years before; that subsequently, all the monuments of men, save those in Egypt, had been destroyed by numerous deluges. That these inundations were historically true, may be admitted, but it is a glaring inconsistency to except from their influence, a low, alluvial territory, that would have been one of the first countries submerged. The disappearance of the island of Atalantis, is another story, founded in like manner, perhaps, upon an ancient geological convulsion, but the details of which are due to the exuberant fancy of this philosopher. In the same dialogue, is a curious approximation to the modern science of chrystallography, derived by him from the Pythagorean school, which, as we before adverted to, sought the remote principle of all things in the power of numbers: for it is stated that the four elements, air, earth, fire, and water, owe their separate properties to their primitive form; the primitive chrystal being pyramidal in fire, cubical in earth, octohedral in water, and icosihedral in air: lending himself to a fanciful cosmogonico-generalization, he asserts that each of these solid primitive forms resolves itself into tetrahedrons, so that the universe is ultimately composed of triangular pyramids. His physiological system, which evinces some acquaintance with anatomy, does not merit much attention, and his zoology is altogether fanciful.

Adopting the metempsychosis of Pythagoras, he asserts that trifling and unjust men, at their first transformation, are changed into women; the most depraved men are transformed into fishes. According to this system, the affinity which exists between animals of different classes, is attributable to each retaining something of its former state. However fancifully physiological and zoological subjects were treated by Plato—sometimes perhaps to veil doctrines it was not safe to divulge openly—there may nevertheless be discerned in his writings, the outlines of those three principles of motion, which in our own times have been called organic life, animal life, and intellectual life.

Such schools, and such men, which entered upon the discussion of every branch of knowledge, could not fail to plant its seeds deep in some powerful mind, and to the great benefit of mankind, if such a mind was free to exert itself, untrammelled by the superstition and jealousy which had cramped the intellectual labours of Socrates and Plato.

Accordingly, after the death of this last philosopher, in the 348th year B. C., in the eighty-first year of his age, Aristotle the Stagyrite, his disciple and successor, appeared upon the scene—an individual, if we are to value men for the variety of their attainments, and their disinterested devotion to the improvement of their fellow creatures, who may claim to receive the highest meed of praise so great a benefactor can receive at our hands. He was fortunate in the period in which he lived, having been brought up at the Macedonian court, a cotemporary with Philip, who subsequently appointed him tutor to his son, Alexander the Great. It was his good fortune to inspire his royal pupil with a love for natural science. It appears that he caused to be transmitted to Aristotle the most remarkable productions of the countries he subdued; so that although the conquests of Alexander were not, in their effects, permanent victories for his family, yet each of them was a real enlargement of the empire of knowledge. Pliny states that more than a thousand persons were placed at the disposition of the philosopher, to assist him in collecting the materials of his history of animals, beside an almost unlimited command of money. At his school, the lyceum, he attended in the mornings with his disciples, to examine his specimens, and in the afternoon he expounded the higher branches of his philosophy. Diogenes Laertius has preserved the title of two hundred and sixty works of this extraordinary man, most of which are lost. They appear to have embraced almost the whole range of human knowledge. Logic, rhetoric, poetry, morals, politics, metaphysics, general physics, meteorology, mineralogy, and the history of animals. On all these subjects, he lays down no rules, but those deduced from observed facts. It may be truly said of him, that he gave to all the sciences the right method of advancement; and that in the natural sciences especially, he collected more facts, and deduced more general laws, than all his successors have done, up to the period of that great naturalist of our own times, Cuvier. Many of his principles in general physics,

as well as in some other branches, have indeed been found false and imperfect, but they were the general expression of the facts he had observed, his intelligence being only limited by his opportunities. His history of animals is a surprising work; it is impossible to think of this monument of his industry and genius, without offering the greatest tribute of admiration to his memory, by admitting, that whether in his classification of animals, or in his immense number of facts and general propositions, he has almost anticipated all that we owe to modern investigation. We reluctantly forbear to enter upon the tempting details within our reach; but to show that his aphorisms are not founded upon à priori assumptions, and that they are the bold results of practical observation, we shall lay a few of them before our readers.

He observes, that all animals, without exception, are furnished with a mouth, and that they possess the sense of touch: these two characters, he considers the only ones that are indispensable: but all animals, he states, of whatever species, differ from another species, in the presence or absence of some other character, common to animals.

All land animals, he observes, have locomotion, but many water animals have not.

Winged insects which have stings in the head, never have more than two wings; but those which have stings in the posterior part, have four wings. He divides animals into those which have red blood, and those which have not, and forms his groupes in a very natural manner. His class of insects is divided into those having wings, and those without wings. This is the distinction adopted by Linnæus, and prevails at this day. He gives the definition of a genus, by adducing solipeda, or simple hoofed animals. This genus is distinct from all others, and includes those animals only which have a simple hoof, such as the horse, ass, &c. &c. Although the Greeks had only become acquainted with the elephant in his own time, he had studied it with his usual accuracy. Experience has shown, that even Buffon has always erred, when he has ventured to contradict this great naturalist, although he lived at a distance of more than two thousand years from the period of Aristotle. His knowledge of fishes appears to have been greater than we possess at the present day. Of their habits, their mode of generation, their food,

their emigration, their diseases, he speaks with the greatest detail and accuracy.

After the death of this great naturalist, 322 years B. C., Theophrastus was the most celebrated of the philosophers of the Lyceum. He was in botany, what Aristotle had been in zoology: but Greece being now subdued by the Macedonians, and the Roman power having gradually interfered with the independence of all free states, science began to decline: nor can the efforts of Pliny the naturalist, be considered a revival of natural science; feeble as those efforts were, they were soon lost in the prostration of all independent action, under the despotism of the Roman emperors. After the death of Augustus, flatterers and panders of the basest kind alone flourished, with few exceptions. The Roman people, at length, unaccustomed to great examples of virtue and knowledge, lost all reverence for them; and before the final overthrow of the empire, by the descendants of those pastoral tribes who had so frequently interrupted the first dawnings of science, the Romans did not know where the dependencies were situated, of which they were the nominal masters. So surely does it happen, that when men, from whatever causes, are permitted to administer the government of a people, with reference solely to their own gratifications, that the public mind, having no bright examples to impel it forward, ebbs, and exposes a vast and unproductive barren. Such was the result long before the fall of the Roman empire.

(*To be continued.*)

ANTIQUITIES AND LANGUAGES OF THE MEXICAN INDIANS.

The writer of the following communication, a distinguished Mexican gentleman, is entitled to the cordial acknowledgements of the Editor, for this interesting paper, and flatters himself it is only the first of a series, that will reflect great light upon both the antiquities and languages of the aboriginal nations of this continent.

There are strong reasons for supposing that the ancient Indian monuments which are found so widely diffused over the territory of the U. States, derived their origin from a people, skilled in arts to which the natives here, who have been known to our race, have always been strangers. We have no evidence, that

the modern races of red men, have ever, with slight exceptions, passed beyond the hunter state. There are instances of stone hatchets being found in tumuli, in the State of New York, made after the Mexican manner, and of a material peculiar to Mexico. This points to a connexion between the ancient nations of Mexico, and the people who constructed the monuments that are found, even in the northern parts of the territory of the U. States. We now want architectural comparisons, between the monuments in the U. States, and those found in the southern parts of America. In this point of view, the present communication of our intelligent correspondent, may prove extremely valuable.

EDITOR.

No. 1. PALACE OF MICTLA.

Sir,—We cannot but regret that the conquerors of Mexico have destroyed, with a barbarism ignominious even for the fifteenth century, the most remarkable edifices and monuments of the various nations which inhabited that extensive portion of the American continent. The Bishop Zumarrága caused the precious annals of the Mexican Indians to be burnt, and destroyed what had escaped the fury of the conquerors. The conduct of these last, formed a contrast with that pursued by their countrymen in the Peninsula, in relation to the celebrated palace of Alhambra, and other monuments of the Arabians. Zumarrága and the first monks who arrived at Mexico, preferred the example set by the inquisitor Tormequada, to that of the monks of the congregation of St. Mauro, in whose convents the sciences found a refuge, and where the treasures of Grecian literature were preserved.

Thus, few monuments of Mexican antiquities have remained, except those capable of resisting the ravages of time; those immense masses, which the nations, as if by instinct, have constructed, as memorials of their existence to future ages.

The writings and paintings which were saved from the conflagrations of Zumarrága, were but few, and consequently, the notices we possess, respecting nations so far advanced in civilization, are scarce, and deserve to be cherished.

The investigations which you propose to insert in your Journal, touching the antiquities and languages of the aboriginal Indians, deserve much attention, and I have thought myself bound to communicate to you some information which I possess, respecting

the Indians of my own country: happy to assist in forwarding your laudable intentions.

One of the few monuments of the first people, which are still preserved in Mexico, is the palace of Mictla, distant twenty miles from the city of Oaxaca, in 17° 20′ N. lat. Mictla, in the Mexican tongue, signifies hell; and the Zapotecas who inhabited that country, called it Liobáá, which means, a place "devoted to repose." The monarchs of Zapoteca, dwelt at Mictla. They were feudatories of the emperors of Mexico, and paid tribute to them in those coloured feathers, of which great use was made for their standards, as well as by the dignitaries of the empire, and their priests. The High Priest of the Zapotecas inhabited the palace of Mictla. Mictla, according to the relation of the few persons who have visited that great catacomb, was an immense cave, which the industry of the Zapotecans converted into a subterranean palace. It consists of four compartments, above and below, with an extensive square in the centre. The edifice is supported by means of columns of porphyry of one entire piece, eight feet in diameter, and five Spanish varas (about fifteen feet) in height. They are after the Grecian taste, without pedestals, and perfectly smooth. They support the roof, which consists of slabs, two varas in length, one in breadth, and one-half in thickness. The slabs, which are about equal in dimensions, are not united by any kind of cement.

The form of the edifice is that of a ducal crown, the superior part having a greater circumference than the inferior. It must be confessed, that in this respect the civil architecture of the Zapotecans is entirely original. In the walls, the cement is as hard as stone. The surface of the walls is covered with mosaics of white stone, derived perhaps from the fine quarries of white marble which are found in the territory of Oaxaca. The pieces of mosaic, are not united by any cement; they are admirably executed, and form branches. It is remarkable that without the use or knowledge of iron,* the Mexican Indians could quarry, form, and polish marble, flint, and the hardest stones.

The entrances—very spacious—were made of three stones of equal size, of an entire piece, and of the same thickness as the wall. Each of the compartments or saloons, served as a temple and sepulchre, to the kings and nobility.

* Mexican tools of copper have been found.

The chief priest performed the functions belonging to the worship of the idols, upon a large slab, raised in the hall, appropriated to these deities. He was clothed in a white garment of cotton, resembling the surplices used by Catholic priests, with another above it, adorned with figures of birds and other animals: he bore a sort of mitre on his head, and a buskin on his legs, studded with pieces of gold. The worship in that temple, or royal chapel, consisted of profound genuflexions, and offerings of incense, furnished by the odoriferous gums, which abound in the woods of Oaxaca. This was the place destined to the sacrifice of human victims, whose hearts were offered to the idols, whilst the bodies were cast into the cave, through a door, closed by a slab, which is yet preserved. Prayers, penitence, and fasting, were also performed in the same place, when any favour was sought, or any evil deprecated from their deities. The chief priests enjoyed the privilege of a sepulchre in one of the compartments.

The kings of Teozapotlan were carried to the sepulchre, in their richest garments, feathers, and jewels, and with exquisite collars of gold; a shield was placed in the left hand, and the spear which they used in war, in the right. At the funeral, discordant and lugubrious instruments were played upon, and amidst lamentations, the life and achievements of the deceased were sung.

Their kings, their great chiefs, in the same manner as the victims sacrificed at the temple, were thrown into the cave, and even some, whilst living, voluntarily threw themselves there, believing it led to the mansions of eternal felicity. The Zapotecas also had their elysian fields: hope and fear have given birth to the same dogma in America and in Egypt.

The Zapotecans believed that the cave was three hundred leagues deep; and in fact there does exist a very great cavity, which has been formed by some cause. I am disposed to believe that riches are buried there, whose resurrection would console the arts. It is to be hoped that the enlightened government of Mexico will cause it to be ascertained whether in Mictla we do not possess a new Pompeii or Herculaneum.

One of the superior compartments was the palace of the Zapotecan pontiff. In it was his throne, covered with the skins of tigers, and rich carpets of the coloured feathers of birds. The other halls, even that of the King, were lower than that of the

high priest. It was, no doubt, a theocratical government: the sacerdotal order was as much respected as the divinity; it was hereditary; and although the priests were not married, yet at certain solemnities they had intercourse with the other sex, and the fruits of this commerce were destined to the service of their religion.

There was a distinct compartment for the priests of an inferior order, one to receive the king in, and another for the nobility. When they were assembled at the palace, all, of whatever rank and dignity, were under the authority of the pontiff. All the floors were covered with mats, upon which they slept; no bed being raised higher for any person whatever.

The Zapotecans were warlike, and had made great progress in the art of fortification. Their last king, Cosijopü was as prudent in his rule, as his father Cosifoeza had been valiant. The Mexicans endeavoured more than once to subdue the Zapotecans, but were always repulsed. Even at this day, the war-like spirit of their ancestors is yet preserved, in the miserable remains of this nation. The Indians of the whole State of Oaxaca are industrious, well mannered and patient.

It is to be regretted that Mictla has not been visited by some one competent to appreciate and describe those rare objects which vulgar eyes assign no value to. I remain, sir, your most obedient servant, A Mexican.

ON THE ACCLIMATING PRINCIPLE OF PLANTS.

It is nature's plan, that nothing should remain fixed and stationary. She exists by motion, and manifests herself through endless changes: even death and decomposition are her pioneers, to prepare the way for life and existence. The very rocks and minerals, (unorganised matter,) are changed by the action of the elements, form new affinities, and yield to the circumstances of moisture and heat, with which they may be surrounded. Animals exhibit still more changes; they possess powers of developement, and the means of continuation of kind. Endowed with locomotion, they can change their climate and habitation: with a natural pliancy of constitution, they can accommodate themselves to the quality of their food, and character of the country upon which they may be thrown, and appear beautiful or deformed

accordingly as they may be acted on by circumstances. Many of them can bear the most violent contrasts of heat and cold, and adapt themselves to many climates.

Vegetables too, are organized, have their growth and decay, and the powers of reproduction. Beyond this we allow them but few capacities; no locomotive powers, none of the sensibilities common to animals, nor that pliancy which can accommodate itself to circumstances. They are the fixtures of nature, with but little latitude in which to flourish, and but little diversity of soil from which to derive nutriment. The object of this paper is to enlarge their sphere, and to show that they possess more power to change their climates, and capacity to bear the contrasts of heat and cold, than we have generally ascribed to them; to illustrate it with many instances where they have actually adapted their growth and habits to a great extent of country, and diversity of latitude, and to urge agriculturists to make more efforts to vary their culture.

Plants have *directly* no locomotive powers, but *indirectly* they have in a great degree the faculty of changing their places, and, consequently, their climate. The embryo germ wrapped in a kernel, or seed, is virtually a plant, ready to germinate when thrown upon its parent earth, and affected with heat and moisture. It is in a most portable shape, and can be transported with ease to an unlimited distance. Nature in many instances superadds to seeds, wings, down, feathers, and chaff, by which they become buoyant, and are carried by the winds of heaven, by the storms that sweep the forest, and by the streams, and currents of rivers, and the ocean, to an immense distance, and through many degrees of latitude! They become finally deposited in some genial soil, and at one remove, or through a succession, they occupy extensive regions. Nature manifests her great care of the embryo, by coating some of her seeds with shells, which protect them from the attacks of insects, and the action of the elements; others have bitter, narcotic, or poisonous qualities, which forbid animals eating them; and many are filled with oily, or resinous matter, which resists for ages, and even centuries, the action of the elements, unless acted upon by the proper degree of heat and moisture. By such qualities they endure, and await a suitable time and conveyance to their destined place, in order to extend and vary their families.

Birds also convey the seeds of plants in their crops over a wide extent, before they become triturated and digested; and when these winged carriers die, or decay, from accident or age, the seeds are deposited, and take root in some distant land. Animals also convey them in their stomachs to a considerable distance, and pass them uninjured by the powers of digestion.

Man, more provident than all, to whom plants are necessary, whose support, whose comforts, and whose pleasures connect him with them, carries their choice seeds, slips, and scions, far and wide. His interests foster their growth, his attentions enrich their products, and his skill and science preserve their existence, and adapt them to their new condition. In an improved community, man's wants multiply: he has occasion for the more varied and rich fruits; more abundant and luxurious clothing, and furniture of vegetable growth; odours to regale his senses, vegetable flavours to pamper his appetites, and all the medicinal plants to heal his various diseases, and invigorate his shattered constitution. He attaches himself to agriculture and horticulture: plants become his companions; he carries a creative resource into those departments, and by his attentions, forms new varieties and excellences, unknown to the wild state of vegetable existence. Such are the means nature has provided for the propagation and extension of plants; such are the indirect locomotive powers they possess. We must no longer, therefore, consider vegetables such inert and sluggish beings.

We will now treat plants as having a kind of locomotive existence. We know that they are very perfectly organized, have sensibility, and sexual intercourse. We know that they have lungs, by which they breathe, and are connected with the air. We know by abundant experience, how easily they are affected by the elements, by heat and cold, moisture and drought. We know how radically soil affects their productiveness, how immediately they are stinted or stimulated by the nature of the extraneous circumstances with which they are surrounded. Beings therefore, that have such perfect organization, that although they are fixed in their places, are deeply changed by every shower, and every breeze, and every stroke of the cultivator—beings, so necessary to the wants, and very existence of animated nature—should possess, in a high degree, the faculty of changing their climate, and of accommodating themselves to circum-

stances, and the strong contrasts of seasons. Nature else would be wanting in her usual foresight, and in her adaptation of one thing to another.

If an animal is carried by accident, or its own wanderings, to a country or climate that is not congenial to its nature, it can and does make use of its locomotive powers, to regain one that is more suitable to it. This happens every day. Thousands of birds and fish, and other animals, migrate regularly, to avoid even the different seasons of the same year, and could not, with all their versatility of constitution, exist without it. We may infer, then, that plants, which, after having rooted themselves, cannot migrate at all, should be endowed with faculties to bear all the changes of the seasons, and even of climate, in the same dull place of their existence. *They are so endowed*, and can often bear more changes, and support more disasters of storms and ravages of insects, than animals; and often continue to flourish under violent and sudden changes.

Human care, and the providences of nature, have given to many plants a great extent of climate and latitude, an enlarged growth, and an increased and improved product. Let us bring together such instances as are within the knowledge of all, and which ought to stimulate our cultivators to greater efforts.

The valley of the Euphrates was doubtless the native region of all those fine and delicious fruits which enrich our orchards, and enter so largely into the luxury of living. We thence derived all the succulent and nutritious vegetables that go so far to support life; and even the farinaceous grains appertain to the same region. The cereal productions began in that same valley to be the staff of life.

Our corn, our fruit, our vegetables, our roots, and oil, have all travelled with man from Mesopotamia up to latitude 60°, and even farther, in favourable situations. The cares of man have made up for the want of climate, and his cultivation atoned for this alienation from their native spot. The Scandinavians of Europe, the Canadians of North America, and the Samoides of Asia, are now enjoying plants which care and cultivation have naturalized in their bleak climes. Melons and peaches, with many of the more tender plants and fruits, once almost tropical, have reached the 45th degree of latitude in perfection, and are found even in 50°. Rice has travelled from the tropics to 36°,

and that of N. Carolina now promises to be better than that of more southern countries. The grape has reached 50°, and produces good wine and fruit in Hungary and Germany. The orange, lemon, and sugar-cane, strictly tropical, grow well in Florida, and up to 31½°, in Louisiana, and the fruit of the former much larger and better than under the equator.

Annual plants grown for roots, and vegetables, and grain, go still farther north in proportion, than the trees and shrubs, because their whole growth is matured in one summer; and we know that the developement of vegetation is much quicker when spring does open in countries far to the north, than in the tropics. In Lapland and on Hudson's Bay, the full leaf is unfolded in one or two weeks, when spring begins, although it requires six or eight weeks in the south. Nature makes up in despatch for the want of length in her seasons, and this enables us to cultivate the annual plants very far to the north, in full perfection. The beans, pumpkins, potatoes, peas, cabbages, lettuce, celery, beets, turnips, and thousands of others, seem to disregard climate, and grow in any region or latitude where man plants and cherishes them. The fig is becoming common in France; the banana, pine-apple, and many other plants, have crossed the line of the tropics, and thousands of the plants valuable for food, clothing, and medicine, and such as are cultivated for their beauty, fragrance, or timber, are extending their climates, and promise much comfort and resource to man. Plants lately introduced, whose cultivation has not run through many ages or years, have acquired but little latitude in their growth, and show but little capacity to bear various climates, because time has not yet habituated them to such changes, and human cares have not imparted to them new habits and new powers.

Nothing can be effected by suddenness in *acclimating* plants; too quick a transition would shock them; it must be a very gradual process, embracing many years, and many removals. The complete success that has attended the plants first named, the earliest companions of man, proves this. In the more recent plants success is exactly in proportion to the length of time that a plant has been in a train of experimental culture.

The most striking method of testing the effect of climate on plants, is to carry suddenly back to the south, such as have been extended far, and become habituated to a northern climate.

Such plants have so much vigour, and the habit of a quick and rapid growth so firmly fixed on them, by a long residence in the north, that when suddenly taken to the south, although the season be long and ample, they continue, from habit, to grow and mature quick, and obtain the name of rare-ripe; because they do not take half of the time to mature, that those of the same family require, which have never been so changed. Gardeners give us early corn, peas, fruit, and turnips, by getting seed from places far to the north; and cotton growers renew the vigour of the plant by getting the most northern seed. This practice is common in the case of most plants, and is founded on the supposition that plants do, and can acquire habits.

The fact supported in the first number of the American Journal of Geology and Natural Science, "that plants are most productive near the northern limit in which they will grow," that they bear more seed or fruit, and have more vigour of constitution, offers much encouragement to agriculturists. This proves that it is not a meagre, stinted existence, devoid of profit or productiveness, that we give to plants, by pushing their culture far north, but a strong and healthful growth, one that repays the labour and attention, by a greater product than belongs to more southern situations.

Every view that we can take of this interesting subject, every fact within our knowledge, whether drawn from the actual state of cultivation, or from physiological investigations into the habits, nature, and construction of plants, goes to show that plants do become acclimated, both in the natural and artificial way, to a great extent. Enough has been witnessed to prove that plants have a physical conformation, that does accommodate itself to circumstances, and have capacities more extensive than are generally ascribed to them: enough has been realized to encourage farther efforts, and to give us hopes of much future benefit.

In this enlightened age, where invention in the arts and mechanical philosophy, is changing the whole order of our social economy, where new comforts and resources, unknown to our fathers, are daily developed, and, as it were, created; in this age, where labour-saving machinery is redoubling the productions of the arts, almost exempting man from in-door exertion, and cheapening all the elegancies of clothing, furniture, buildings, and books, until luxuries are common to rich and poor, and educa-

tion within the reach of all, why should not agriculture awaken, put forth its energies, and partake of that spirit of improvement that is working its magic in all other departments? Why does it not avail itself of that knowledge of the nature of the soil, which chemistry gives? those tabular statements of the weather and climates, which naturalists furnish? those philosophical investigations into the nature and habits of plants, which have been presented? and that labour-saving spirit that seems to know no limits in other branches of business? Why should all our capital improvements fly the open fields, where culture exists, and be realized only in cabinets and manufactories?—Agriculture follows the old dull routine, and its products lumber on to market in heavy carts, whilst all other branches move on, aided by a thousand inventions, with ease and despatch. That field, whence our food is derived, and on which our very existence depends, lies neglected, whilst we cultivate luxuries to a morbid excess. Every thing is cheapened but human food; every thing becomes annually more attainable, but the necessaries of the table. If this disproportion between the arts and agriculture continues to advance, we are destined to live in a sort of splendid pauperism: enjoying the luxuries of fine houses and furniture, we shall enjoy every thing to satiety but bread. W.

FOSSIL REMAINS, FOUND IN ANNE ARUNDLE COUNTY, MARYLAND.

A PARAGRAPH having appeared in the public papers, stating that some very curious fossil remains had been found in the State of Maryland, by Dr. J. S. Owen, the Editor addressed a letter to that gentleman, containing a set of queries. Dr. Owen, with great promptitude, has answered them in a most intelligent manner, and has added to the value of his communication, by enabling the Editor to examine the fossil remains themselves.

They prove to be the dorsal vertebra of a small whale, and the caudal vertebra of a larger one, together with the fragments of some of the ribs. The shells, which have reached us in a very mutilated state, are the Pecten Jeffersonius, Turritella Plebeia, of Say, and Venerecardia Blandingi of T. A. Conrad,* together with other well known tertiary shells. The deposit in

* Journal Acad. of Nat. Science, Vol. VI. part 2, p. 229.

which these remains were found, is a very extensive one. Mr. M'Clure, in his sketch of the geology of the U. States, designated the low part of the Atlantic coast, as alluvial. This was in the infancy of the science, before the line was well drawn here between marine and fresh water fossils, and before it was known that this deposit exclusively contained marine remains. Dr. Van Renselaer, we believe, was the first to give it its true place in the tertiary. Subsequently, the zealous labours of Dr. S. G. Morton, and Professor Vanuxem have not only made known to us many of the fossils of the Atlantic coast, but have made a permanent distinction between the tertiary beds in Maryland, and those much lower in the series, of New Jersey. Mr. T. A. Conrad has a very satisfactory and intelligent paper on this subject in the journal of the Academy of Natural Science, Vol. vi. part 2. The valuable papers of Dr. S. G. Morton, are in parts first and second, of the same volume, to which we with pleasure refer our readers. Mr. Say's able "account of some of the fossil shells of Maryland," is found at page 124, of Vol. iv. of the Journal of the Academy of Natural Science.

Had there been any thing new in the fossils Dr. Owen has so obligingly forwarded to us, we should have devoted a plate to it. Dr. Owen's section is valuable, and we publish it, together with his letter, not only because he deserves every attention at our hands, but because we think it a model for all future communications of this kind, made under similar circumstances. It is only by noting every thing, and preserving every thing, that we can hope to become thoroughly acquainted with the geology of this flat part of the coast, especially. EDITOR.

LETTER FROM DR. J. S. OWEN, TO THE EDITOR.

Anne Arundle, Md. July, 1831.

Sir,—THE statement which appeared some time past in the papers, respecting some fossil remains, said to have been discovered by me, was not altogether correct, only a few bones having been found, and those not such as to enable me to say to what class of animals they belong. This statement was made without my knowledge, and contrary to my wish; and it was not until after the lapse of some weeks, that I was informed any publication on the subject had taken place.

Yet as the bones found are of a large size, and as I have no

doubt many more could have been obtained, had not unavoidable circumstances prevented, I will endeavour to answer the queries you have so politely favoured me with. But from my ignorance of geology, I am fearful that I shall not be able to give you as explicit information on the subject, as I could wish.

Query 1. At what depth from the surface were the bones found?

Ans. At the depth of thirty-two feet.

2. Were they found separated from each other, or lying together?

Ans. They were found lying together.

3. Were they found in a situation to induce a belief, that the animal died on the spot, or that the bones were accidentally transported there by water, or otherwise?

Ans. From the bones found being so few in number, I am unable to form any opinion, as regards the probability of the animal having died on the spot, or of their being brought thither "by water or otherwise." They were found lying horizontally, the vertebræ a few inches within, and the ribs part within and part without the well, during the excavation of which, they were discovered.

4. Are the bones *rolled* or water-worn?

Ans. Not rolled, but water-worn.

5. What is the nature of the soil through which the digging was effected? was it composed of loose unindurated earth, with mud, pebbles, or gravel? or not?

Ans. The entire depth of the well is seventy-two feet, eight inches. I have drawn up, according to your directions, the following table of the beds.

Feet.	
1	Rich black vegetable mould.
12	Hard and firm clay.
3	Sandy, a little gravel, no pebbles.
10	Potter's clay, in numerous layers.

Bones. 46	A dark ash-grey bed, very compact and firm, requiring the pick-axe for some few feet, and fracturing into large flakes. Then sandy, somewhat firm, the colour a shade darker, and so continued without any marked difference to the bottom of the well. No pebbles or gravel were found below fifteen feet. The bones were found six feet within this dark ash-grey bed, at thirty-two feet from the surface.

6. Was any vegetable matter or shells found near the bones, and of what kind?

Ans. Vegetable matter was found a few feet below the bones in considerable quantities, but exceedingly decayed, rendering it impossible to say of what kind. From the size of the pieces removed, I at the time judged them to have belonged to some tree.* These vegetable remains were intimately blended with a fine compact earth, which, when separated, had a knotty, snake-like appearance. No shells were found remaining near the bones, but their impressions were found in *great abundance*, a few above, but vast quantities below. There are both univalves and bivalves. About twenty-eight feet below the bones, a bed of oyster shells, one foot thick, was found; and a few feet below them, a number of shells, and some few teeth of fish, all in a perfect state of preservation.

7. What bones have you found? Do you think they are the bones of one animal, or of more than one? Give a rough sketch of the grinding surface of the largest tooth.

Ans. There were only found two vertebræ, and parts of several ribs. The length of the largest vertebræ is four inches and five-eighths. The distance from the extreme end of one transverse process, to the extreme end of the other, six inches and a half.†

The spinous process, as well as the spinal arch, is wanting, having been knocked off. The diameter of this vertebræ, at its largest end, is three inches and five-eighths; its shortest two inches and a half. The spinal arch is entire; its greatest diameter one inch and three-fourths; its shortest, one inch and a fourth. The

* Lignite?—Ed.

† In this measurement, I have allowed for that part of each transverse process, which is wanting.

ribs are unfortunately much broken, and not being able, from their situation, to attain but some portions of them, I am unable to state accurately their length; but from a careful examination made by myself, on the spot, I am disposed to think they were from four and a half to five feet in length. The smaller vertebra is convex before, concave behind, has a bold strong spinal arch, and no processes on the fore part. The bones are petrified, but in the smaller vertebra and ribs, the petrification is more complete. No teeth or jaws of this animal were found.

I have no doubt that many more bones might have been found; several feet below the spot whence the described bones were taken, many ribs were found jutting into the well. I only desisted from continuing my search after more bones, on account of the apprehensions of the workmen that the sides of the well would fall in, and because a supply of water was particularly important to me at the time.

It will give me great pleasure to forward these fossil remains to you, in any manner you may point out, being very respectfully your obedient servant,

J. S. Owen.

To Mr. Featherstonhaugh.

ON THE SILVER, GOLD, AND PLATINA, OF RUSSIA.

By James Dickson, Esq. F. G. S. M. B. S. &c.

New Brunswick, N. J., August 17, 1831.

My dear Sir,—I do myself the honour of forwarding to you for insertion, if you please, in your Journal, the following communication, which has been extracted principally from the journal I kept, when recently in Russia. My long residence in the mining districts of South America, has made me familiar with the subject of the precious metals.* I anticipate great pleasure in a visit I propose making in a short time to the "gold region" of the United States, when I shall pay particular attention to the

* The writer of this paper is the Mr. Dickson whose desperate resistance to, and extraordinary escape from the Mexican banditti, near Puebla de los Angelos, in 1829, is narrated in the New Monthly Magazine, 1830, lately edited by Mr. Campbell.

It requires to know Mr. Dickson, and to have seen the frightful scars he bears upon his person, as we have done, to give full faith to that most romantic narrative.

Mr. Dickson is a very experienced metallurgist, and his proposed visit to the south, will be highly favourable to our knowledge of its metallic and mineral resources.

Editor.

analogies you suppose to exist between it, and the gold district in Mexico. I remain, my dear sir, very assuredly yours,

JAMES DICKSON.

To G. W. FEATHERSTONHAUGH, ESQ.

St. Petersburg, 1831.

"GOBOLEFSKY accompanied me next morning, and introduced me to General Karnieff, director of the imperial mint, and of the mines in general of all the Russias. A little, good-looking old man stood at one of the windows of the saloon as we entered, and on my name being announced, he came forward and welcomed me. Our conversation turned upon the mineral resources of the distant regions of Irkoutsk, on the Chinese frontiers, where of late, much silver ore had been obtained. The mines of Ekatherineburg had long been an object of interest to the Russian government, and the science of mining had been particularly patronized by the emperor Nicholas. Notwithstanding the minute and scientific research which had been devoted to the improvement of their mines and mining operations, their eager spirit of discovery, and their almost ridiculous—from the extreme to which it was carried—ideas of economy, had rendered them ever restless, and eternally on the *qui vive* for every new invention.

"The mines of Irkoutsk, many thousand versts from the scene of their other operations, had been worked to a considerable extent within late years, yielding, according to the Russian ideas of silver mines, a large and increasing revenue. In the silver ore of these mines some gold had been met with, which, with the increasing produce of those of Ekatherineburg, had rendered the establishment of the French process of refining with vessels of platina, necessary. Their principal source of gold, was, however, in the gold washings of the Ural mountains, which bade fair to rival, in extent and value, the more celebrated gold alluviums of the Brazils.

"The silver ores of Ekatherineburg were considered to be of greater value than those of Irkoutsk, or the other districts which had lately shown themselves productive; although high expectations were entertained as to the result of the exploring commission which had been sent northward the preceding year, since reports of vast riches, embosomed in their most northern snows, had been the favourite theme of discussion among the scientific men of St. Petersburg.

"Little as I had been struck previously with the produce of the Russian silver mines, I was fain to confess, then, that another Potosi or Valenciana might arise in their distant Siberia; and it was with awakened interest that I availed myself of the request of the mining corps to investigate and analyze the gold and silver ores of Siberia.

"The mining corps establishment at St. Petersburg, is an interesting exhibition. It is there that young men of genius and talent are patronized, educated, and provided for by the emperor; it is from thence that individuals are sent abroad into the various countries of Europe, to visit all that is magnificent, and all that is famed, in the annals of mining. England, Germany, and Sweden, have been again and again explored, and the gradual improvements and interesting discoveries of each mining district, presented in detail before the committee of this mining corps. Joined to a large and magnificent collection of minerals, amongst which may be seen the rare and massive specimens of platina and gold, and those large beautiful beryls, all products of Siberia. Extensive models of the working of mines are constructed for many versts under ground, extending to a considerable distance along the banks of the Neva; while one large saloon is entirely occupied with the models of every machine used in mining operations throughout the world.

"The silver ores of the Russian mining districts, are principally found with a matrix of quartz; the green and blue carbonates of copper form a prominent feature in the character of these ores, and although they consist of native, and oxides of, silver, they deserve rather the name of copper, than that of silver ores. Of sixty samples, all of them from the mines of the interior, upwards of forty-four were carbonates of copper; the others resembled more than any thing else, the 'jabones' of the Mexican veins.

"Those who have witnessed the immense produce of one single silver mine in Mexico, and the quality and richness of the ore, would doubtless have participated in the surprise which I felt during the progress of my investigation. To find that those ores which had been held up as of great value, were scarcely equal to the lowest quality of Mexican ore, was indeed a disappointment. Most of the samples returned the ore at the rate of sixteen ounces of silver to the ton weight; there were here and there, it is true, one which might be calculated at twenty times

that amount; but the great mass was of that quality from which a Mexican miner would have turned away, without bestowing on it another thought.

"I have said before, that some of the silver ores contained gold. I had the satisfaction of informing the mining corps of a discovery of gold, and one which held forth promise of great results, in one of the carbonates of copper from Ekatherineburg.

"The Mexican silver ores are seldom worked, so as to leave any profit, if they contain less than six or seven marcs of silver in the monton of thirty-two cwt. The Russian mining corps complained bitterly that they were unable to obtain more than twelve ounces out of the sixteen ounces contained in the ton weight; an ore so poor, that no Mexican would ever dream of working it; and yet these men not only procure a considerable quantity of silver, but obtain it at but little cost; to be sure, their cheap slave labour, and their immense forests of fuel, are advantages with which no other country can pretend to compete.

"The annual produce of silver in the Russias, is estimated at about 1000 pouds of forty pounds each; but what, after all, is this 1000 pouds or 40,000 pounds, to the produce of the Valenciana mine in Mexico, which for many long years produced its millions of dollars annually.

"Young Demidoff had not yet returned from Italy; from his relation and agent Daniloff, I met with every attention. His cabinet contained many beautiful specimens of platina, most of which were designed as presents to the crowned heads of Europe. Although some single masses of platina weighed seven or eight pounds, none could be compared to those in the cabinet of the mining corps, one of which weighed about twenty-seven pounds. My own specimens, which were presented to me by Zobolefsky, although weighing 800 grains each, and of which I had been not a little proud, dwindled away in the view of the great rarities lying in profusion in Demidoff's cabinet. Owner of the most celebrated platina deposits, and gold washings, he had had many opportunities, in the course of a few years, of selecting and putting aside, not only large massive lumps of gold and platina, but what was yet more interesting; a great variety of most beautiful and perfect crystals of gold.

"The mass of platina before alluded to, as weighing twenty-seven pounds, was found completely isolated, and at nearly sixty

versts from the usual deposits of platina, in a bed of red clay, where some slaves were employed in making bricks. Those streams, in the beds and on the banks of which, the gold deposits are met with, contain more gold, and less platina on the European, than those on the Asiatic side of the Ural mountains. The amount of gold obtained from these washings, had amounted for the year 1830, to nearly half a million sterling.

"It may be well imagined to what an extent their operations must be extended, when the hundred pouds or four thousand pounds weight of soil, seldom yields above sixty-five grains of gold, and varies from sixty-five to one hundred and twenty grains,—which is there considered rich,—to the hundred pouds. Nevertheless, their mining operations are conducted with such skill and success, as even to obtain of this limited quantity nearly the whole amount; and that too, with such little cost, as to have been indeed far beneath my expectation.

"Of the simple, and yet beautiful processes made use of in the gold washings of the Ural mountains, I shall hereafter speak, well convinced of the great utility and service which they would be of, if made known to the mining regions of other countries.

"The Demidoffs, Davidoffs, and many other Russian families, are acquiring princely revenues from the employment of their slaves in these gold washings; but it is not alone the gold, the platina itself is another great source of their prosperity; more especially since all the platina is now coined at the imperial mint, and established as part of the current coin of the realm.

"The coins made of platina are beautiful; those large pieces with the head of the emperor are the best, and show better the effect and polish which coins of this metal can take. Though many hundred pounds weight of platina are coined monthly, into pieces of eleven and twenty-two rubles, they disappear rapidly from the circulation. They may be met with occasionally, and a few at a time, in the hands of the brokers. I consider their price much above the London price of malleable platina, which is at present about twenty-five shillings English per ounce: considering that the crude platina is the produce of the country, the Russian price for malleable platina, which is about twenty-eight shillings, is too extravagant; and yet this does not arise from the expense of manufacturing, but from the cost of the material itself, which is far higher than the platina of South America. The

cause of this, is the monopoly and easy disposal of it at a high price through the coinage.

"The price in St. Petersburg for crude platina, is fixed at three rubles, paper, per zolotnicht, or about twenty shillings English per ounce.

"Humboldt has already pointed out the resemblance which exists between the gold formations of Russia, and those of the Brazils. From the extensive and minute researches which he made while exploring these districts, much information has been given to the scientific world.

"They had not as yet met with any veins containing gold, although they were ever on the alert. There is on the property of Demidoff, a position in which a river empties itself into a morass, bounded on one side by a hill of quartz, and then issues again. No gold is found in the bed of that river previous to its entering the morass, but when it flows from out of it, its sands are rich in metal. Some pieces of quartz, containing gold, had been met with, to all appearance the debris of the outcropping of some vein.

"Difficult would it be to form a true theory of the manner in which gold deposits have been effected; and many, indeed, have been suggested which have looked well at first, and then vanished into nothing before the stubborn facts which reveal themselves in a long-continued and minute research into the origin of the gold alluviums of many countries.

"The gold washings of Tippeanni in La Paz, belonging to the Indian chief Pazas Kanki, now attaché of the Buenos Ayres legation in London, are of the most singular and interesting that have met my notice. There are facts in the history of these gold deposits, which differ from all others with which I am acquainted.

"On a subject such as the origin of gold or platina deposits, it is indeed difficult to generalize; and though a theory reconciling the various incongruities, and striking facts of each gold district, has been with me a subject of no slight consideration, yet I must confess, many as have been my opportunities of ascertaining their exact nature and position, I must leave it to be determined by abler men.

"It might be imagined, that the circumstance of finding gold in the beds of rivers, would naturally suggest the exploring of

the river to its source, in quest, among the distant mountains of the place, from whence it came. Though the explorer might be gratified in finding his search successful, and meet in some rent and broken ravine through which the waters are now rushing, with the veins of quartz, displaying to broad view their metallic riches; yet let him seek to effect his object, under similar circumstances, in another, and perhaps adjacent district, he will lose himself in an investigation of a formation which never yet, or ever will be found to contain gold. He will meet with the debris of rocks long ago passed away in the conflicts of the elements; he will meet with evidences of a state of things which now no longer exists on the surface of these wild and singular regions. In some tracts of land the gold will be found disseminated poorly yet regularly in layers; in others it will be disclosed in some peculiar position, en masse—in one solid lump—in little circles of a few feet, as if deposited by the vortex of some minor whirlpool; and in fine, in such occasional directions as to set all attempts at theory at defiance.

"Data, nevertheless, have presented themselves during the progress of gold mining in various countries, which have proved highly interesting, and of the greatest service in assisting the investigation of the position, nature, and quality of gold deposits."

ON THE EFFECTS OF VARIOUS POISONS ON LIVING VEGETABLES.

By Richard Harlan, M. D. Surgeon to the Philadelphia Alms-house Infirmary, Member of the Royal Academy of Medicine of Sweden, &c. &c.

I completed last year the following series of experiments, in order to test the powers of vegetable life in resisting the effects of vegetable and mineral poisons. The positive nature of the results which were obtained, is calculated, in my opinion, to throw considerable light on the *physiology* of plants; a department of science, at the present time, too much neglected, even by the members of the medical profession, and by the practical agriculturists, for the most part, entirely overlooked.

The application of certain poisons to plants and flowers, in order to destroy noxious insects, is not unfrequently recommended; and doubts have been expressed as to the injury that might occur

to the plants themselves by such treatment: it has even been positively asserted that the destruction of the plant is the necessary consequence of the application of certain vegetable poisons in some instances.

In the progress of science, next in importance to the accumulation of true knowledge, is the necessity to disencumber ourselves of error. If the results of the present experiments possess no other merit, they will be esteemed interesting on this account alone. I have been led to the present investigation by perusing a notice of experiments of a similar nature, by M. Marcaire Princep, a professor of botany in Geneva, in the "Bulletin des Sciences Naturelles," for March, 1830, of which the following is an extract:

"The experiments detailed in this memoir, have for their object to prove that the juices or extracts of plants, poisonous to animals, are equally so to the vegetables from which they are obtained. Thus M. Marcaire has succeeded in killing branches, and even entire individual plants, of the *datura stramonium*, *hyosciamus niger*, and *mornordica elaterium*, by plunging them into distilled water, charged with the juices and extracts of these plants, or even by watering them with this narcotic water."

"M. Goeppert, of Breslau, has published in the annals of Poggendorff, an account of experiments from which he derived very different results." But neither of these authors extended their experiments to the introduction of poisons into the substance of the plants.

I first confined myself to a repetition of the experiments of M. Marcaire, but obtained results entirely at variance with his. I now determined to pursue the subject on a more extensive scale. In the garden of the Philadelphia Alms-house Infirmary, I selected a number of young and thriving plants, and assisted by the gardener, and several of the resident physicians, I applied the following named poisons, as hereafter specified, taking care to wound the *bark* of the *perennial*, and the *interior* parts of the *annual* plants, so that the poison should be directly applied to the wounded sap-vessels. The poisons used, were, the extracts of stramonium, belladonna, and cicuta; the essential oil of *nicotiana tobacum*, diluted hydrocyanic acid, and powdered oxydum arsenici.

Experiment 1. September 18th, 1830. A strong thick solution

of the extract of belladonna and cicuta, (German manufactory,) was introduced into the bark and pith of different stems of the stramonium, at 12, meridian.

2. Extract of belladonna introduced into the stem of the palma christi.

3. Powdered white oxyd of arsenic was freely spread about the root of a young palma christi, and the plant watered.

4. Arsenic introduced into the stalks of two young tobacco plants, near the roots.

5. Two young stramonium plants were selected: arsenic was introduced into the stalks and stems of one, and spread about the root of the other, and the plant watered.

6. Dilute hydrocyanic acid introduced into an incision made into the stalk of a stramonium.

7. Dilute hydrocyanic acid poured on the root of *impatiens balsamina.* (Lady-slipper.)

8. Strong oil of tobacco introduced into the stalk of palma christi.

9. Idem into the stalk of stramonium.

10. Idem into the stalk of a young tobacco plant.

11. Idem into a branch of *ficus carica.* (Fig tree.)

12. Idem placed freely round the root of a young pyrus, (pear tree,) the earth being loosened and watered.

13. Idem placed round the root of palma christi.

14. Idem introduced into the stalk of euphorbia sericea.

15. Arsenic freely spread round the root of the *mimosa sensitiva*—exposed to the rain and dews.

It is not necessary to enter more minutely into details of these experiments, some of which were frequently repeated, with great care. The same result universally followed in every instance. Not one plant, shrub, or flower, displayed signs of the least injury from the varied applications of the different poisons; some, indeed, appeared to thrive better, for the attentions which were rendered them.

I shall only add a list of plants, on which some of the experiments were subsequently repeated at my request, by Mr. John Carr, at Bartram's botanic garden.

1. *With extract of belladonna.—Zinea elegans, impatiens balsamina, vinea rosea,* and *kælruteria paniculata.*

2. *With extract of cicuta.—Zinea elegans, tagites, vinea rosea,* and *salvia splendens.*

3. *With oil of tobacco:—Amaranthus and Zinea.*

These additional experiments, performed by a skillful practical botanist, confirm the observations previously made: hence, we are permitted to conclude, first, That the experiments detailed by professor Marcaire, are erroneous. Second, That substances which act as lethel poisons to animal life, are not so to vegetables.

We cannot but admire the wisdom, order, and harmony of creation! fixed to the earth by immutable laws, plants and flowers would have soon ceased to exist, had their susceptibilities, like those of animals, rendered them liable to the agency of poisons, to contact with which they are so much exposed.

R. Harlan, M. D.

We had the satisfaction of assisting, during the present month, together with professor Del Rio, at a repetition of those curious experiments on vegetable substances, with vegetable and mineral poisons. They were conducted by Dr. Harlan, assisted by Dr. Moore, in the garden of the Philadelphia Alms-house Infirmary, and the results corresponded precisely with those obtained in September, 1830.

The plants to which the poisons were applied, were palma christi, stramonium, nicotiana tobacum, balsamina impatiens, brassica, geranium, and carduum benedict.

The poisons used in the experiments, were ol. tabaci, oxyd. arsenic, extr. stramonium, extr. cicuta, corros. sub. in sol., ol. terebinthi, and a strong solution of opium.

Each of these poisons was separately introduced into the circulation of individual plants, by incisions made in the stems, under the leaves, and by similar, separate applications of them to their roots; by infusions, and by powder also, in the case of arsenic. In some instances the poisons were placed around the roots only, viz. corros. sublimate, arsenic, sp. turpentine, and oil of tobacco.

In none of these instances was any of the plants poisoned. One of the young geraniums faded, after constant impregnation, for three days, of the earth about its roots, but this is evidently attributable to its soil being rendered unfit for the support of vegetable life.

We must therefore adhere to the reasonable opinion, that plants have the property of segregating from the soil or atmosphere, those principles which are proper for their healthy state, and of rejecting those which are injurious to their organization.

If plants yield to the deleterious influence of those principles which are injurious to other organized bodies, it is because—as in the case of the young geranium—they cannot appropriate those salutary principles, upon which their existence depends, and which enables them to exercise their natural functions, one of which is, to reject that which is injurious to them. We speak now of the circulation of plants, and not of mechanical application of poison to their parts. Oil of turpentine applied several days to the bark of many trees, and especially the linden tree, will soften, and eventually destroy the part; but the experiments tried with the balsamina, or lady-slipper, the palma christi, the cabbage, and tobacco plant, whose roots were liberally supplied with spirits of turpentine, prove that it did not affect them through their circulation. Dr. Harlan's attention to this subject, will be properly appreciated by those engaged in the study of the physiology of plants. EDITOR.

ON THE VALUE OF GEOLOGICAL INFORMATION TO ENGINEERS, AND ON THE INEQUALITIES OF THE EARTH'S SURFACE, AND THEIR TRUE LEVELS ABOVE TIDE WATER.

THE very gratifying encouragement which this work has received from so many distinguished officers of the government, resident at Washington, has induced the Editor to suggest through these pages, that this unexpected patronage, which, on account of the advancement of science, is so honourable to all the parties concerned, may receive the most beneficial direction, and our knowledge of the geology of this continent, and of physical geography, be greatly increased, if the gentlemen connected with the military branch of the U. S. government, would direct some physical reconnoisances to be accurately made; in our present ignorance of which, we are not able to describe faithfully, the degree of inequality of the surface of this continent, nor ascertain the natural connexion between mountain ranges, and table lands, that are locally distinct from each other. The trigonometrical surveys that have been performed in Great Britain, and the maps which have been executed by order of the board of ordnance, upon a scale of an inch to a mile, are valuable monuments, as well of the intelligence of that government, as of the cultiva-

Plate 4.

Fig. 1.

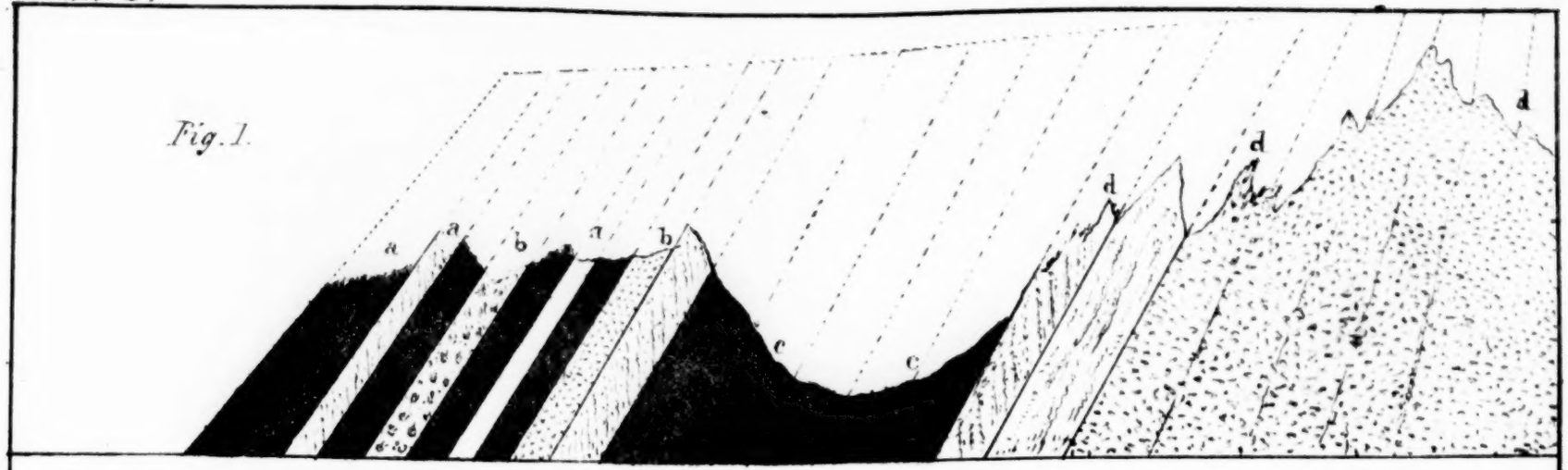

Fig. 2

a.a. *Horizontal Sand Stone*, b.b. *Granite*, c.c. *Slate*, [illegible], e. *Lias*.

tion which natural science has received in that country. They give all the information which military engineering requires, and in practical geology, they point out the probable existence of all the useful metals and minerals, and the extent of the formations in which they are contained. No blame, it is true, can attach to the government here, for having hitherto omitted to follow that example. The field of investigation is too extensive, and the probable expense too great, to be undertaken without the authority of congress. Nevertheless, opportunities appear to have been neglected, of adding to our stock of knowledge, in this branch of natural science, without the necessity of going into additional expenditures; at least, any that would be regarded as objectionable, when compared with the importance of the object to be obtained. The very extensive surveys and reconnoisances which have of late years been made by order of government, in relation to internal communications for military and civil purposes, are here alluded to. Admirably as they have been executed, it is nevertheless true, that they have been performed without reference, in most cases, to the value of those mineral and metallic substances, which are contained in the geological formations, the engineers were obliged to travel over, and the production of which would go far to justify the execution of those contemplated internal improvements. There is no evidence that geological or mineralogical information, have been held of any account, in those expensive surveys, whilst it is true, that any person competent to the examination of those branches, might in all cases have conferred an intrinsic value upon those surveys and reconnoisances, even if none of them were executed. When the value of geological information shall become more extensively known, territorial maps will probably have geological characters given to them, which can be done for almost the same expense, in every case of original survey. Where important information of this character, is omitted to be acquired, it is a loss to the nation, and an omission which ought to be brought, both before the consideration of the government, and the public.

There is no mathematical truth more firmly settled, than that the mineral formations, of which the crust of the earth is formed, succeed each other in an invariable order. That the most important deposits of metals are found low down in the series, as well as the marbles most used in the arts. Coal, that invaluable

combustible, upon which the wealth of Great Britain has been mainly raised, lies always beneath certain rocks, and never above them.* We see, then, how important it is, for the practical engineer to possess geological information, as a part of his profession; or, where this combined information does not exist to the desired extent, that a practical geologist should at least be associated with the engineer. In either of these cases, the engineer in running his lines, would be able to report to his employers, the true mineral character of that part of the geological series he is treading upon; and as we now know that all the formations are invariable in their order of succession to each other, so from knowing what the superficial formation is, we infer with certainty, the probability of our finding the most valuable deposits of metals, minerals, or coals. Maps, with these geological characters, have a great intrinsic value. It cannot be denied that individual proprietors are interested in ascertaining the vertical, as well as superficial value of their possessions; and the day will arrive, when geological surveys, will become quite as important as superficial ones. It is easy, then, for government to confer, in this manner, an intrinsic value upon all their surveys and reconnoisances; and the writer of this paper will be happy, if these suggestions should attract the attention of some of those distinguished gentlemen, connected with the government, whose names are included in the list of his subscribers. It is the want of accurate knowledge in the structure of rocks, and the order of their succession to each other, that detracts so much from the value of the published account of those various expeditions to the north-western parts of this continent, undertaken by order of government; it is due, however, to the distinguished travellers, to whose direction these expeditions were confided, to say, that they could not be supposed to possess that intimate knowledge of geology, which distinguishes the present times, and which is the fruit of a very rapid advance in the science.

Hoping that the next expedition ordered by government, may be free of those defects inherent in those, which, in all other respects, have been so admirably accomplished, it is now respectfully suggested for the consideration of Maj. Gen. M'Comb, and the other officers in the military branch of the government, that

* This applies to the productive beds; as varieties of vegeto-carbonaceous matter are found higher up in the series than the great deposits.

a great deal of valuable information, connected with the scientific knowledge of the surface of country, might be collected from officers on service, without exposing the government to any material expense.

The study of chains and ranges of mountains, forms at this time a most interesting branch of geology. It would seem that all the great inequalities of the earth's surface, which have not been formed by the action of excavating waters, owe their origin to an expansive subterranean power, which has thrust them up through ancient surfaces. During the present era, mountains have been formed in this manner, both from the sea and land. In the year 1538, Monte Nuovo, in the bay of Naples, was thus thrown up through the water, in one night, to the height of four hundred and fifty feet; and in Mexico, in 1759, a tract of land, from three to four square miles in extent, was upraised, together with the cone or peak of Jurullo. The mass in its most convex part is five hundred and twenty-four feet above the old level, and its celebrated peak Jorullo, is 1695 feet high. The rock, constituting the old level, was a base of green-stone, with porphyry, basalt, &c. It is evident from a very careful consideration of geological phenomena, that all the mountain ranges, with the exceptions before made, have been formed by that sort of subterranean action, which has produced Monte Nuovo and Jorullo. All mountains, then, have come up through other beds, and have necessarily dislocated them, and laid them upon their flanks at high angles. In various parts of the world, we find mountains thus situated, and without any horizontal deposits lying upon the edges of the ancient disturbed beds; whence, we are authorised to infer, that the epoch of their upraising is comparatively recent, and posterior to the last deposits.* In Leicestershire, England, the granite, b, b, and slate, c, c, of Charwood forest,† exist in beds highly inclined; but on the edges of those beds, new red sandstone, a, a, and lias, e, are found in a horizontal position; proving that these last have been deposited subsequent to the upraising of the first. We thus infer, that those primitive beds, were partially raised in the ocean; and that at a subsequent period, the secondary rocks were deposited upon them, marking two distinct geological epochs. On the other hand, the system of mountains,

* This is a safe conclusion in cases where no presumption exists of beds, superincumbent upon them in the series, being absent from particular causes.

† Plate 4, fig. 2.

to which Mont Blanc, and the western Alps belong, have the oolites, the green sand, and the tertiaries; or the upper secondary rocks, and the very last deposits, previous to the diluvium or superficial soil, lying in a disturbed manner upon their flanks; showing that the mountains, having moved all the other beds, were upraised since the tertiaries were deposited. Hence, we come, by a fair induction, to the conclusion, that the western Alps of Europe, were upraised at a different period from the granite hills in Leicestershire, and at a geological period, much nearer our own times. To illustrate this principle, we have borrowed from Bakewell, pl. 4, fig. 1, a section of Alpine beds, near the Col de Balme, and Mont Blanc; a, a, are alternate beds of oolite, sand stone, and lias, equivalents of those horizontal beds e, in pl. 4, fig. 2.; b, b, are disturbed beds of pudding-stone, with the pebbles not lying on their longest axes, but vertical; c, c, a col, or passage excavated in the soft slate of the mountains; d, d, vertical plates of granite beds, with pyramidal caps, called aiguilles, or needles. The dotted lines mark the supposed original prolongation of the beds, before the granite came up, bearing them like drapery on its flanks, where they lie at an inclination, varying from 65° to 80°. Mont Blanc is 15,534 feet high, and these pyramidal peaks, which time, and the deluges consequent upon their upraising, have worn into their present forms, were once 10,000 feet beneath the surface. Thus we have the proofs, that the lias formation in England, was deposited subsequent to the upraising of the granite at Charrwood forest; and that the Pennine Alps were raised subsequent to the deposition of the lias.

Since the crust of the earth, with the exception of the igneous rocks, is composed of a series of beds, that have been deposited in succession to each other, it results, that chains of mountains, and table lands, may have been upraised at any of the periods belonging to this succession, and that each period may have its peculiar system of mountains. This, to a great extent, has been found to be the case, and we can thus distinguish their geological periods, not in the chronologies affecting the present order of nature, but in the great history of subterranean dynamics, to which the surface of the earth owes its present form, modified, as it no doubt has often been, by the action of the waters, which have been displaced by these elevations. The practical uses,

then, to be derived from the detailed geological examination of mountains, are numerous.

If any chain should be productive of useful metals, or minerals, we may investigate all the branches of the system it belongs to, with a view to trace its continuities.

In the establishment of boundaries, indestructible and unvarying monuments present themselves to the geologist, which escape the attention of the engineer, if he does not know how to avail himself of them. It cannot be denied, that the expense and inconvenience, consequent upon the light manner in which the northern boundary was settled, in the treaty of peace in 1783, would have been greatly avoided, had the disputed territory received a rigorous geological examination. From the documents which have hitherto been published, it does not appear that geological data have been much relied on, for the adjustment of this important question, which is not yet settled. It is greatly to be desired, that in the re-surveys which are yet to be effected, before the delivery of the respective territories is definitely made, that these considerations be not overlooked.

There are other branches of this subject which deserve the attention of that estimable officer, Col. Abert, of the topographical bureau, to whose department information of this kind properly belongs. The details of our physical geography are incomplete: many inaccuracies have crept into the only accounts we have of the mountains, table lands, and lakes, in the interior of the United States. Their respective levels above tide water, have, in most instances, been the result of estimates, rather than of admeasurements.

As it may be supposed, that there is not a cantonment under the U. S., which does not possess one or more officers, regularly trained as military engineers, all these errors might be gradually corrected, if those officers were to avail themselves of the rare opportunities which many of them possess, being quartered in situations almost inaccessible to others. The contributions which they could make to physical geography, would form an important addition to our knowledge of the earth's surface, independently of their great practical uses. The general elevation of table lands, the true height of mountains and hills, the exact level at which the great western lakes are found above tide water, are important branches of the geology of the U. States. In the

valuable labours of Lt. Col. Long, much has already been done; but the time has arrived, when this science demands accuracy, and this can be given to us only by actual admeasurements. Perhaps at some future day, Congress may authorise a general trigonometrical survey, which will include all these objects; in the mean time, much may be effected through the influence of the commander in chief.*

Of some parts of this continent we are almost without details: of California, we know little or nothing, and of that extensive territory north of 50° N. latitude, we have scarce any geological information. The chain of high lands, which branches from the Chippewayan mountains there, and which runs N. E., between lake Winnepec, and the great Slave lake, appears to be the water shed of that region. It is said to connect itself with the highlands, running north of lakes Superior and Huron. It would be a great service rendered to science, if some of the British gentlemen, familiar with that part of the physical geography of the British dominions, would give us some accurate information of the country. In giving an account of the elevation of countries, it is best to state the general height of the table lands, distinct from that of the mountains which are based upon them: in the following table, the elevations of the table lands, above the level of the sea, are alone expressed.

	Toises.	Feet.
Table land of Irun, in Persia, .	650, or	3900.
Moscow, in Russia, . .	67,	402.
Swabia, in Germany, .	150,	900.
Lombardy, in Italy, . .	80,	480.
Auvergne, in France, .	174,	1044.
Schweitz, . . .	220,	1320.
Bavaria, ...	260,	1560.
Spain, ...	350,	2100.
Plains of the Rocky mountains,		3000.

The following table expresses the most authentic elevations above the level of the sea, which we possess. Many of them have been admeasured: others, no doubt, are mere approximations.

* It would be an act of injustice to Peter A. Browne, Esq., of this city, not to notice his indefatigable endeavours to interest the government of this State, in the geology of Pennsylvania, with a view to the construction of an accurate geological map. The disinterested and useful labours of that gentleman in the cause of geology, do him great honour.

	Feet.
Long's Peak, Chippewayan, or Rocky mountains,	15,000.
Mount Washington, N. Hampshire,* . . .	6,234.
Mansfield mountain, N. Peak, Vermont, . .	4,279.
Catskill mountains, Round Top, N. York, . .	3,800.
Black Hills, lat. 40° N. W. of Missouri, . .	3,500.
Alleghany mountains, in Virginia, . . .	3,100.
Ozark mountains, west of Mississippi, . . .	2,250.
Wisconsan Hills, S. of lake Superior, . . .	2,250.
Catskill mountain-house, N. York, . . .	2,214.
Sources of streams tributary to lakes Winnepec and Superior,	1,200.
Head waters of the Mississippi, ...	1,200.
Break Neck, near West Point foundery, . .	1,187.
Rainy lake, S. E. of lake of the Woods, . .	1,100.
Tourn mountain, Rammapoo, N. Jersey, . .	1,067.
Lake of the Woods, ...	1,040.
Dog lake, ...	1,000.
Source of Miami, ...	964.
Source of Sciota, ...	919.
Sources of the St. Peter and Red Rivers, . .	830.
Mouth of the Platte, Missouri, ...	680.
Mouth of the St. Peter, Mississippi, . . .	680.
Lake Winnepec, ...	630.
Lake Superior, ...	595.
Lakes Huron and Michigan, ...	571.
Ohio, near Wheeling, Virginia	565.
Lake Erie, ...	565.
Ohio, at Cincinnati, ...	414.
Point Levi, opposite Quebec, ...	310.
Mouth of the Ohio, ...	300.
Lake Ontario	231.

EDITOR.

* This is the loftiest of the White mountains.

ORNITHOLOGICAL BIOGRAPHY.

By John James Audubon, F. R. S. &c. &c.—Published by Judah Dobson, and H. H. Porter, Literary Rooms, Philadelphia.

To say that this is one of the handsomest books ever reprinted in America, is to assert one of its slightest merits. The great reputation which Mr. Audubon had acquired as an artist, by the publication of that most magnificent of all works, "The Birds of America," has been very much increased, by the work we are now about to notice, which, whilst it is a companion and key to the first, is, itself, an acquisition to any library. The "Introductory Address" at once reveals the history and character of the author.

"In Pennsylvania, a beautiful State, almost central on the line of our Atlantic shores, my father, in his desire of proving my friend through life, gave me what Americans call a beautiful 'plantation,' refreshed during the summer heats by the waters of the Schuylkill river, and traversed by a creek named Perkioming. Its fine woodlands, its extensive fields, its hills crowned with evergreens, offered many subjects to my pencil. It was there that I commenced my simple and agreeable studies, with as little concern about the future as if the world had been made for me. My rambles invariably commenced at break of day, and to return wet with dew, and bearing a feathered prize, was, and ever will be, the highest enjoyment for which I have been fitted.

"Yet think not, reader, that the enthusiasm which I felt for my favourite pursuits, was a barrier opposed to the admission of gentler sentiments. Nature, which had turned my young mind towards the bird and flower, soon proved her influence upon my heart."

He married, passed twenty years in varied and in infructuous attempts to acquire riches, "after the ways of men;" and at length, worn out and irritated by ill fortune, and the remarks of his friends, he broke "through all bonds," and abandoned himself to nature, in "the woods, the lakes, the prairies, and the shores of the Atlantic"—thus cutting himself off, for ever, from the hope of rising to the dignity of justice of the peace in his own county, or from the advantages of keeping "the best liquors of any store-keeper of the village." These, in the face of the remonstrances of his friends, were abandoned for nature, cultivation of heart and mind, and that approbation of the wise and good, which no adverse circumstances can now deprive him of.

In the report made to the Royal Academy of Sciences, by Baron Cuvier, is the following passage:

"The Academy has commissioned me with rendering to it a verbal account of the work, which, in one of its preceding sessions, has been communicated to it by Mr. Audubon, and which has for its object, the birds of North America. Its character can be given in a very few words, by saying *that it is the most magnificent monument which has hitherto been raised to ornithology.*"

Mr. Swainson, one of the most distinguished naturalists of the age, has said of this work,

"It exhibits a perfection in the higher attributes of zoological painting, never before attempted. To represent the passions and the feelings of birds, might, until now, have been well deemed chimerical. Rarely, indeed, do we see their outward forms represented with any thing like nature. In my estimation, not more than three painters ever lived, who could draw a bird. Of these, the lamented Barrabaud, of whom France may be justly proud, was the chief. He has long passed away; but his mantle has, at length, been recovered in the forests of America."

The "Ornithological Biography" contains a description of one hundred birds, natives of America, all of which are delineated of full size, and coloured after nature, in the great work which Cuvier and Swainson have so justly praised. To these descriptions are attached others of the trees, shrubs, herbs, and flowers, where the birds build and disport, in their native woods. The botanical characters of these plants are annexed. The ornithologist and the less learned lover of nature, will find a rare treat in these vivid descriptions, comprehending the most delightful details of the manners and customs of the feathered tribes. But what, perhaps, will be deemed by general readers, to enrich especially this attractive work, are the rare, and most interesting narratives and local descriptions, interspersed, very judiciously, to the number of twenty, through the work. They are as follow: the Ohio, the Great Pine Swamp, the Prairie, the Regulators, Improvements in the Navigation of the Mississippi, a Flood, Meadville, the Cougar, the Earthquake, the Hurricane, Kentucky Sports, the Traveller and the Pole-cat, Deer Hunting, Niagara, Hospitality in the woods, the Original Painter, Louisville in Kentucky, the Eccentric Naturalist, Scipio and the Bear, and Colonel Boon. All these passages arrest the attention very forcibly, and some of them are written with great eloquence. So powerful are the impressions made by those graphic narratives, that we rise from the repeated reading of them, almost as familiar with the subject, as if we had been the companions of Mr. Audubon in his

many romantic adventures.—Upon a future occasion we propose giving our readers some extracts, for which we have not room at present.

In awarding to him these just praises, we seek to vindicate his claims to the confidence and admiration of his countrymen.

We believe it is Madame de Stael, who, when speaking of neglected merit, observes, that time pays both principal and interest. So it will be with Audubon: ere long, the intrinsic value of his labours to natural history, will be universally recognized. We shall hear of no more unfriendly remarks upon the great "Woodman" of America, as he has been called in Europe, from city ornithologists, who, like Cowslip in the Agreeable Surprise, are most of all pleased with the sight of a "roast duck." We know that some of Mr. Audubon's "strange stories" have alarmed some tender consciences, that annually

> "Perform their scientific rounds,
> As far as Bow bells fling their sounds."

In his great work, Mr. Audubon gives, in plate 21, a representation of "Mocking birds defending their nest from a rattlesnake." The serpent has got up the bush, and has reached the nest to suck the eggs, when the birds attack him. It is one of the most masterly drawings we ever saw. Swainson says of it, "every part of the story is told with exquisite feeling." Whether any one besides Mr. Audubon, has ever seen the crotalus in that situation, we do not know. Mr. Audubon declares he has; and we have no idea of disputing his word, because we have not seen, perhaps solely from want of opportunity, what he knows he has witnessed. So rapid is the progress of natural science, that what may be called romance to-day, becomes history to-morrow. We certainly did not know it was the habit of the rattlesnake to climb plants; Cuvier says they do not. But the mocassin snake is well known to climb plants after his prey; and both this snake and the rattlesnake live upon birds and squirrels. Now the mocassin, which is the Coluber tisiphone of Shaw, Trigonocephalus of Oppel, is approximated to the rattlesnakes by Cuvier, who says it is "distinguished from them by the want of a rattle, but having the same pits behind the nostrils, and being equally venomous." The truth is, they are so much alike, that it must be a very difficult matter to distinguish between living specimens at liberty, where the rattles of the one are mute, and not apparent: and such

situations may well occur. We saw, only a few days ago, in the possession of Dr. Blanding, of this city, a preserved specimen of the mocassin, so precisely like the rattlesnake, that there was no apparent difference, except that it wanted the rattles: this renders it possible that Mr. Audubon may have mistaken one serpent for another, and altogether improbable that his statement is a fiction. Yet this has been ill-naturedly attributed to this great naturalist, who may really have found the rattlesnake itself in this position, for aught we know to the contrary.

Mr. Audubon has in these works shown the world, that nature has not spoken to him in vain, and that he can express the feelings she has inspired him with, with great force. As an author and a naturalist, he has raised himself beyond the reach of that envy and neglect, which are too often successfully directed against genius, ere its plant has grown into strength, and has put forth the blossomed honours, which impose silence even upon detraction. We gathered from his introductory address, that those social honours which have been lavished upon him in Europe, have been denied him, in this, his native country. We imagine it is because he has been comparatively unknown here. Where there are

> "To censure, many,
> And but few to praise,"

a man wages fearful odds against his adversaries, such as none but the most unequivocal merit can prevail against. That of Audubon has prevailed, and his native country is, as she well may be, proud of her son. He will hereafter find himself more justly appreciated. It will give him pleasure to learn, that since the recent publication of his "Ornithological Biography," the American Philosophical Society has enrolled his name amongst those of its members. We understand Mr. Audubon is soon expected from Europe, to pursue his investigations, and to complete certain departments of his works. We hope on his arrival in his native land, it will somewhat contribute to cheer his heart, to know how much we admire and value his works, and how ready we are to do justice to them.

TO READERS AND CORRESPONDENTS.

We pledged ourselves in our last number to show, that a statement in the Journal of the Franklin Institute for July, 1831, attributing very unworthy conduct to the individual who is now editor of this Journal, was, on the part of Dr. Isaac Hays, from whom it proceeded, a *deliberate falsehood*.

Before we make that pledge good, we beg to offer a few remarks to our subscribers for the following reasons. First, because we are desirous, at once, to apologize to them for having, in a moment of irritation, been provoked to the use of epithets which could not possibly either amuse or instruct them. We regret having done so. We wish that time and room—neither of which were then at our disposal—had permitted us, instead of angry words, to have laid a temperate statement before them, of the causes that required our entering upon a defence against the statement which offended us, and which, as we shall show, was only one part of a systematic attempt to injure, through the editor, the circulation of this Journal.

Second. We wish to show, that this, far from being a private dispute of the editor, is a question of a much graver nature, involving the freedom of opinion in matters of science, and the right of an individual to expose a malignant attempt, to which more than one individual is a party, to make him odious in the eyes of the friends of a deceased naturalist, and so affix upon him with the public, the character of an unfeeling and heartless disturber of the ashes of departed worth. It has been imputed to us in the columns of one of the best journals of this country,* that this bears no evidence of being any thing but a private dispute. In the narrative we are about to draw up, we cannot but indulge the belief, that our readers will agree with us, that had the editor remained silent under continued attempts to misrepresent his conduct and opinions, the result would have been injurious to the cause of science, to himself in the social circles of the city he dwells in, and fatal to the circulation of the journal he conducts. With such motives before him, he feels himself justified in entering upon that defence in the pages of his own journal, which will be found upon this, as upon all other occasions, devoted to good sense, fair dealing, and truth.

In the early part of 1831, the editor of this journal was induced to deliver a public course of lectures on geology, in the city of Philadelphia, as he had previously done in the city of New York, for the sole purpose of advancing the cause of natural science in this country. The unexpected popularity of these lectures, was the leading cause of the existence of this journal. Whilst his residence in this city was considered only a temporary one, every thing, as far as it affected himself, reflected *couleur de rose;* but as soon as he became a permanent resident, and a candidate for public confidence in the walks of science and literature, he discovered that Philadelphia was the seat of a self-constituted authority over literature and opinions; and that any one who ventured to doubt the validity of the appointment, was sure to come in for a full share of anathema. This authority, too, was well acquainted with the use of that efficacious weapon, 'spargere voces ambiguas.' There were feuds also in the domains of science, and not to be a declared friend, was, in the estimation of some, to be an enemy. For a while the editor went on, unscathed amidst the absolutists of literature and science, without selecting particular advisers and assistants for the arduous course he was about to pursue; but as soon as he made known his determination to choose where he was sure of finding honesty and intelligence, and to discountenance all empirics and pretenders, he was made sensibly to feel that he was *monsieur de trop*, and that it was not intended he should sit upon a bed of roses. Anonymous letters, scurrilous attacks from country papers, which had been refused by the press in town—private misrepresentations of the editor's conduct and opinions—all these were resorted to. In one newspaper it was asserted "Mr. Featherstonhaugh is a *foreigner*, and did not only bring with him, but now fosters in his bosom, a contemptible opinion of American literature and talents." This, directed against one who has resided twenty-five years in the United States, and who has devoted his youth and his fortune to the advancement of its interests, was not thought too gross for the columns of an American newspaper. The calumny closed by stating, that the establishment of this journal would "absolutely retard the advancement of science in America;" and then concluded, "I have heard a number of scientific gentlemen express themselves much in the same manner that I have done; and it is to be hoped they will act as they have talked, and will influence others to do so when Mr. F's prospectus comes out." Meaning, to dissuade others from subscribing to it.

Certainly no one can suppose that the editor could be insensible to such proceedings: it is in vain to say, that malignancy of so low and scurrilous a character ought to be disregarded. If this were true, as it affected himself, the editor was bound to feel for the interests of his publisher, and to protect this work for that sole reason. To have remained silent, would have been to abandon, not to protect the interests of his friend. Those who have censured him for the epithets he has used, did not know the private annoyances he

* The Chronicle of the Times.

was subject to, and how much restraint he had put himself under, by not noticing them before.

How he could be so much provoked, as to indulge in those epithets, we now come to relate.

In the twelfth of those geological lectures before alluded to, when on the subject of comparative anatomy, the lecturer, having his table crowded with fossils, had to explain each of them, in a rapid manner, in turns. There were two mutilated jaw bones of the Mastodon, which he had drawn from the collection of the American Philosophical Society, where they had been hitherto unnoticed. These, as they differed from any other jaw bones of the mastodon, having an alveolar process, or socket, towards the end of each, he thought it proper to make a few slight remarks upon; inasmuch as the description of a young scull of the genus mastodon, under similar circumstances, had been published in the Transactions of the American Philosophical Society, and had been, by a deceased naturalist, raised to the rank of a new genus, under the following title: "*Description of a New Genus and New Species of Extinct Mammiferous Quadruped. By John D. Godman, M. D.*" It is due to truth to say, that when this conformation was proposed, as a new species of a new genus, it was rejected by every naturalist of the city of New-York; and long before the lecturer had declared his opinion on the subject in public, Dr. Harlan of the city of Philadelphia, who is without a rival there in the knowledge of comparative anatomy and zoology, had publicly declared, that the characters relied on for raising the animal to a new genus were altogether insufficient; the reasons for which were subsequently published in Ferrusac's Bulletin des Sciences Universelles, for 1830. These opinions, without mentioning any names, the lecturer stated he concurred in, and believed the genus would have to be abandoned. Having those jaw bones before him, he could not, without doing injustice to his class, and to the cause of natural science, pass over one of those erroneous conclusions, to which all naturalists are subject, and for the treatment of which as erroneous, he had such able support. But he did it with the consideration due to the memory of a meritorious naturalist, whose name never escaped him upon the occasion. He had no motive for throwing a shade over his memory, for he never had had any intercourse with the late Dr. Godman, never came into any sort of collision with him, and believes he was equally unknown to that gentleman.

This, the lecturer pledges himself was his conduct upon that occasion, and without appealing to, perhaps, the uncertain recollections of his class, he esteems himself fortunate in being able to show, from the best proof the nature of the case will admit, that it was so. Two or three days after the delivery of that lecture, Mr. Chandler, the intelligent editor of the United States Gazette, published, as it had been his custom to do during the course, a full report of it. It cannot be imputed to that gentleman, that he had any motive to misrepresent what fell from the lecturer upon that occasion; his talent and accuracy are undoubted. On turning, then, to the report of Mr. Chandler, in the files of the United States Gazette, we find the following passage, which comprehends all that was said on the subject:—

"He took occasion here to state his opinion, and adduced facts to prove its validity, that the new genus Tetracaulodon Mastodontoides, must be abandoned; as the only distinctive character upon which it rested, was the presence of milk tusks in the lower jaw, which were common to various species of the Mastodon, before the individuals had reached their full growth." This account, which substantially agrees with the private notes of the Lecturer, has been placed beyond all doubt, by an admission made in an anonymous communication which appeared in the National Gazette on the 24th May, 1831, a week after the publication of the Report of the Lecture in the United States Gazette. And as this anonymous communication has a great deal to do with this controversy, we shall insert it.

A few days after the delivery of this lecture on the 13th May, Dr. Isaac Hays, at one of the stated meetings of the American Philosophical Society, addressed the meeting on the structure of the jaws, and dentition of the mastodon, using upon this occasion, the two jaws which the lecturer on geology had previously exhibited. After various reasonings, he made the following declaration: "That perhaps if that were the occasion for him to express his opinion, he would say that this character (the teeth in the rostrated extremity of the lower jaws) was insufficient to raise the animal to the head of a new Genus." Now Dr. Isaac Hays came to this conclusion,—which was *the identical one expressed by the lecturer*—after inspecting the jaws which the lecturer had *previously presented to his class.* It is true, Dr. Isaac Hays, added, that notwithstanding this, he was disposed to believe it was an animal distinct from any species of mastodon previously described, and was entitled to be considered a new species. At this meeting the lecturer on geology was present, and was silent: he perceived that Dr. Isaac Hays had embraced his opinion, as far as he had expressed it concerning the genus, and as to the supposition that it might be a new species, that was a totally different question, which could be hereafter decided only by the examination of many similar osteological remains, if fortunately they should ever be discovered. In philosophical zoology, the creation of a new genus is a matter of some moment. The surface of the earth is variously constituted, as to climate, inequalities, and productions: but nature animates every part of it, and gives

to every animal functions appropriate to the condition of its existence. The ox has cloven feet, which spread, and give him a better support when he treads, and thus enables him to seek his food in the marshy lands, which the small and solid footed horse does not venture upon. The voluminous tusks of the elephant and mastodon, are given to them in like manner, for conservative purposes. So are our own teeth to ourselves: but if every unconformable case of dentition, every instance of teeth protruding in the wrong places, or running obliquely to the direction of the jaws; or, if every particular contraction or expansion of the jaws themselves, and every varying external appearance, shall be deemed of sufficient importance to constitute a new genus or a new species, every individual will be a distinct genus, and classification will eventually become a branch of mathematics. If we are bound to treat this occasional deviation in the dentition of the mastodon in this manner, what will be made of our own race, when the present surface of the earth shall be added to the number of the ancient geological formations, and our bones be disinterred by some future race of intellectual beings!

At the conclusion of Dr. Hays' address, he handed in to the president a paper containing, as he expressed, the substance of the remarks: a committee was formed to examine it, and report upon it for publication. At the head of this committee was placed *his particular friend*; a preconcerted arrangement often very convenient, both for good and for evil, and therefore acquiesced in sometimes. As this address was a somewhat unusual procedure before the American Philosophical Society, and as it involved a matter of some interest in fossil zoology, the few naturalists who were present looked with some attention to the future proceedings of that committee. If there had existed any real difference of opinion between the lecturer on geology, and Dr. Isaac Hays, the subject was now in the hands of a committee of the American Philosophical Society, and the parties for the present, were certainly bound to leave it there. We shall see how far this decorum was observed by one of the parties. Dr. Hays's address was delivered on Friday, the 20th May: on the 24th, the following anonymous article signed X, appeared in the National Gazette:—

"It is with great pleasure we learn, that some of the scientific investigations of our lamented Godman, which had been incidentally alluded to in a recent popular lecture on geology in this city, have been triumphantly sustained and vindicated in a lecture delivered before the American Philosophical Society, a few evenings since, by his friend Dr. Hays. It was asserted in the geological lecture, that 'the new genus Tetracaulodon Mastodontoides (of Godman) must be abandoned, as the only distinctive character on which it rested, was the presence of milk tusks in the lower jaw, which was common to various species of mastodon, before the individuals had reached their full growth.' It is believed that Dr. Hays satisfied every member present, that Dr. Godman's animal was different from any other heretofore described; in corroboration of which he produced from the splendid collection of the society, two of the largest jaws, both of which were possessed of the socket supposed to exist only in the young. The good feeling which prompted the defence of the scientific character of a departed friend, has been amply rewarded in the investigation of the subject by the *brilliant discovery* of four new species of this extraordinary family, among the fossil bones of the rich collection of the society, and that of Mr. Wetherill. A description of these was presented the same evening to the society, intended for publication in their transactions, and it is believed that the public will be very shortly favoured with it, illustrated by engravings of the different species.

"X."

The palpable misstatements contained in this article, could not escape any one interested in the subject. Instead of Dr. Isaac Hays's address being a "triumphant vindication," it was an unequivocal abandonment of the new genus: it was disingenuously concealed, that the two largest jaws were the identical jaws presented by the geological lecturer to his class; and as to the *brilliant discovery* of four new species, it had no existence out of romance. It was not worthy of being distinguished from amidst the mass of disgusting puffs which force their way into the public papers, but for one circumstance, which disclosed to the lecturer on geology, that it was also intended to wound him. He soon after its publication, *got the complete proof*, that this anonymous publication, originally contained very hostile allusions to him, which had been subsequently expunged; that the composition had received some assistance from, and had been given to the press, by the very individual, bound in honour and duty, to discountenance its production, viz. *The chairman* of the committee of the American Philosophical Society, charged with the consideration of the subject.

That Dr. Isaac Hays was the author of that disingenuous puff, the writer of this narrative does not assert, not having the proof of it; that is a secret between *his friend* and himself. It is hardly to be supposed, that any one would take the trouble to draw up such a paper, without a prospect of deriving some supposed advantage from it. The unexpected discovery of the conduct of the chairman of the committee having opened the eyes of the lecturer, to the combination forming against him, he sent the following answer to X., which was published in the National Gazette of May 26, 1831.

"*To the Editor of the National Gazette.*

"SIR—When a matter has been referred for adjustment to impartial arbitrators, the appearance of exparte anonymous statements is evidence at once of weakness and unfairness.

"Such is the character of the communication signed X., in your paper of Tuesday, the 24th. Neither was your Gazette deemed of sufficient importance to attain the secret object of the writer; a literal copy of it having been lodged at the same time with a respectable morning paper, into whose columns it thus surreptitiously got the next day.

"It is not the intention of the writer of this note to repeat at this time the particular history of the transaction which has produced this anonymous attack, the nature of which is perfectly understood by those whom it concerns. That history is to be found in the United States Gazette of this morning. The writer will content himself with stating, that the matter upon which the difference of opinion has arisen was referred on Friday, the 20th, to a committee of three members of the American Philosophical Society, supposed to be entirely unprejudiced, by a majority of the members present. If any one of them was not so, he will not be able to conceal the fact that he was covertly placed on that committee for the purpose of perpetuating error. Unimportant as the matter may appear, the interests of natural science and of truth are involved in it; and individuals who clearly show they are not friends to impartial investigation, must suppose their conduct will be vigilantly attended to.

"It has been usually attributed to those who cherish the love of natural history, that their truest reward is that certain elevation of mind they receive in the cultivation of their pursuit. A true naturalist loves only to be taught by nature, and disdains to teach by other means. It is the empirical pretender alone who is your anonymous oracle.

"As to the statements of X., they are all wide from the truth. He is afraid of the decision of the committee, and, therefore, 'with trumpets and with shawms,' he is 'triumphantly sustaining and vindicating *brilliant discoveries*,' the fame of which, it is predicted, will never extend beyond the columns of a newspaper." "F."

Dr. Hays, however, it appears, was determined to force himself into notice, and to remove all doubts as to who wrote the article signed X., he procured the following statement to be published in the July number of the Journal of the Franklin Institute.

"Dr. Hays rose, and after some prefatory remarks, stated in substance as follows. That an attack upon the scientific reputation of Dr. Godman, late Professor of Natural History in the Institute, having been made very recently by a lecturer on geology, in a public lecture delivered in the hall of the Institute, at which many members of the society were present; and that a thorough investigation of the subject having resulted in a complete refutation of the attack, he thought it would be interesting to the members of the Institute to be put in possession of the facts upon which the vindication of their late Professor rested.

"The lecturer before alluded to, had stated to his class, that the animal described by Dr. Godman as new, under the name of *Tetracaulodon Mastodontoideum*, was nothing more than the young of the common mastodon. In support of this, the lecturer had exhibited two lower jaw bones from the collection of the American Philosophical Society, one of which he stated to be that of a young animal, and showed the socket which had once contained the tooth characteristic of the animal described by Dr. Godman, while the other, which he said was that of an adult, was asserted by him to have contained no such socket. The lecturer had also exhibited a tusk which he said was the milk tusk of the young of the gigantic mastodon.

"Doctor Hays proceeded to say, that the jaw exhibited by the lecturer as that of a young animal, had proved, on examination, to be that of an adult, as the dentition clearly showed; while in that admitted by the lecturer to be the jaw of an old animal, the remains of the socket which had once contained a tusk, was clearly to be seen. And further, that the tusk exhibited by the lecturer as a milk tusk, was evidently that of an old animal.

"Dr. H. stated that he had communicated to the American Philosophical Society, the proofs of the accuracy of the preceding statement.

"A. D. BACHE, *Chairman.*

"J. HENRY BULKLEY, *Rec. Sec.*"

This statement, which is malignantly intended to injure the editor with the friends of Dr. Godman, and with the public, is a mass of inconsistency and falsehood.

First. It has been shown that the scientific reputation of Dr. Godman never was attacked.

Second. That there had been no refutation of an attack, but that an unequivocal assent had been extorted from Dr. Hays, by the specimens which the lecturer in geology had used.

Third. That the lecturer never had asserted one of the jaws to have been that of a young animal with a socket, and the other, that of an old animal without a socket; but

had produced them before his class, for the sole reason that they each had a socket. Of this the note below is a convincing proof.*

The number of the Franklin Institute, was put into the Editor's hands, when the last page of his Journal was printing. Irritated at so open and undeserved an attack from the pages of a Journal, to which he had, as he has shown in a note of his last number, endeavoured to be useful, he spoke of this Dr. Isaac Hays, as he thought he deserved to be spoken of; but if time for reflection had been given to him, he should have preferred to have suppressed some epithets he indulged in, in his anger, and have patiently waited for a more favourable opportunity, of narrating the true history of this unpleasant controversy, into which he has been compelled to enter. He wishes he had done so, and in that wish he expresses an earnest hope, that he will be excused by his subscribers, if any of them thinks he has passed the bounds of decorum. They will perceive in this narrative, that he has no slight grounds for believing there is a malignant conspiracy on the part of a few active individuals, to hinder the circulation of this Journal. This has been attempted both in public and *in private*, without success; *the only instance* where a subscription to it has been discontinued, is that of the chairman before alluded to. There have been a few instances of vindictive and scurrilous attacks in some of the newspapers: these have been disregarded, because, considering the public press as an engine, having a great influence upon writers, and the success they many endeavour to attain, the Editor feels under a deep sense of gratitude to it, for the most unexpected, flattering, and encouraging approbation he has received, from almost every distinguished paper in the city and union.† It is his sincere desire to avoid all controversies; he regrets having been forced into this. Whilst it is a part of his duty to expose sciolism, pretension, and every movement calculated to retard the progress of natural science, he admits that the chief object he has proposed to himself in the establishment of this Journal, is the developement of American natural history and geology, and the doing justice to the talent and learning of American writers on these interesting branches. He appeals to all that he has hitherto published, for the sincerity of his professions. He repeats the pledge contained in his prospectus, that all "approved original papers from correspondents, bearing the stamp of good sense, will be published upon convenient occasions."

He has the satisfaction of informing his readers, that the subscriptions to this work, are now become too numerous, to admit of the names being published, after this number, without inconvenience. EDITOR.

* I accompanied Mr. Featherstonhaugh when he selected two jaw bones of the mastodon from the collection of the American Philosophical Society: they were selected, because each of them, having an alveolar process or socket, Mr. F. intended by them, to illustrate the structure of jaws of that class, and which, in conformity to his intentions, he did, during his lecture.
RICHARD HARLAN, M. D.

† The National Gazette is an exception amongst the city papers. In its columns the Monthly American Journal, devoted to American natural history, has never been alluded to, although it was, according to custom, presented to the Editor.

We take very great pleasure in commending to the notice of the public, the Illinois Monthly Magazine, published at Vandalia, in that State, and conducted by Mr. James Hall. We frequently, after hurrying over the multifarious periodical literature of the day, turn to its refreshing pages, which come upon our fatigued spirit, as its kindred breezes do, in these canicular times, upon the face of nature, drooping under excess of heat. The contents of the last number we have received, for July, are very attractive, especially the "Notes on Illinois," which we shall take an early opportunity of republishing. The Gopher there mentioned as a non-descript, is the Geomys bursarius, or earth-rat, with pouches, of Rafinesque.

We have been favoured, by "A Subscriber," with a copy of Wood's Mosaic History, revised and improved by the Rev. J. P. Durbin, A. M., of Augusta College, Kentucky. We shall hereafter notice this interesting work, and rejoice that geology possesses, in the western States, so valuable and intelligent a friend as Mr. Durbin.

☞ *The period of the delivery of this number, has been retarded by an unexpected disappointment, which obliged the Editor to substitute one article for another, and consequently to cause a different plate to be engraved.*
G. W. F.